A STUDY OF THE EYE CONDITIONS OF PUPILS AT THE IOWA SCHOOL FOR THE BLIND DURING THE YEARS 1937 TO 1947

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A STUDY OF THE EYE CONDITIONS OF PUPILS AT THE IOWA SCHOOL FOR THE BLIND DURING THE YEARS 1937 TO 1947 AND A SUGGESTED PLAN FOR THE EDUCATION OF THE BLIND AND PARTIALLY SEEING CHILDREN IN IOWA

Submitted by

DOROTHY LOIS MISBACH

(B. Sc. in Ed., Boston University, 1943)

In partial fulfillment of requirements for the degree of

Master of Science in Education

Approved 8/12/48

P. C. Potts

UNIVERSITY OF WISCONSIN

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For encouragement in this work and for assistance in innumerable ways, the writer is indebted to the students and staff members of the Iowa School for the Blind, Vinton, Iowa. Special acknowledgment is made to Mr. Leslie M. Hays, superintendent of the school, and to Miss Georgie Lee Abel, the principal, for their cooperation and willingness to assist in providing materials. Sincere thanks are due to Dr. P. C. Potts, assistant director of the American Foundation for the Blind, New York, for his thoughtful assistance in reading this paper.

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PART I

A Study of the Eye Conditions of Children Attending the Iowa School for the Blind from 1937 to 1947.

Chapter I

Introduction

Chapter II

A Comparison Over the Ten-Year Period of All Causes by Etiology

Chapter III

A Comparison Over the Ten-Year Period of All Causes by Site (Topography) and Type of Affection.

Chapter IV

A Comparison Over the Ten-Year Period of the Distribution of the Amount of Vision Remaining.

Chapter I

Introduction.

Chapter II

A Comparison Over the Ten-Year Period of All Causes by Color.

Chapter III

A Comparison Over the Ten-Year Period of All Causes by Race (Nonwhites) and Type of Affection.

Chapter IV

A Comparison Over the Ten-Year Period of the Distribution of the Amount of Tuition Remaining.

CHAPTER I

Introduction[1,2]

This study was made and this paper is written in the interest of the blind and partially-seeing children in the state of Iowa.

It divides itself into two main parts:

(1) A Study of the Eye Conditions of Children Attending the Iowa School for the Blind from 1937 to 1947; and

(2) A Suggested Plan for the Education of the Blind and Partially-Seeing Children in Iowa.

The plan used for the first part of this study was that set up by the Committee on Statistics of the Blind for the classification of causes of blindness. This plan provides for a two-fold classification,

(1) By etiological factor (the disease or accident which was fundamentally responsible for the primary eye condition) and

(2) By topographical factor (the part of the eye affected).

The present "classification" is the outgrowth of six years of experimental work, during which time it has been tried out on seven thousand cases, drawn from various parts of the country and from differing age groups.

Information concerning the eye conditions of students attending the Iowa School for the Blind was available from the eye reports on file at the school at Vinton, Iowa, for the school years

1937 to 1947. Miss C. Edith Kerby, a member of the Committee on Statistics of the Blind, had compiled the information which was used in three tables for the school years of 1941-1942, 1942-1943, and 1943-1944.

The enrollment for each school year during the period covered in this study was as follows:

Year	Enrollment	Year	Enrollment
1946-1947	157	1941-1942	164
1945-1946	146	1940-1941	170
1944-1945	150	1939-1940	176
1943-1944	126	1938-1939	197
1942-1943	149	1937-1938	191

Taking the total enrollment for the study from 1937 to 1947, eye reports for 1,656 pupils were charted.

If a child entered school and remained for three days his name was included on the enrollment report even though he might have dropped out of school after attending a short period of time.

In Tables I, II, and III, percentages have been computed for each figure used. While these percentages are valuable in showing distribution as of any one year, they do not indicate trends because the percentages for each year must add up to 100. This means that an actual decrease in one item will automatically make an apparent increase in all of the other items in the group, or vice versa.

Miss Kerby states that another factor which affects the adequacy of their annual tabulations as a means of showing trends

to 1967: Jane C. Smith Hyphy, a member of the Committee on
[illegible] of the blind; had examined the information which was
used in three tables for the school years of 1961-1962, 1962-1963,
and 1963-1964.

The enrollment for each school year during the period covered
by the study was as follows:

[illegible]-1967	[illegible]	1961-1962	[illegible]
[illegible]-[illegible]	[illegible]	[illegible]-[illegible]	[illegible]
[illegible]-[illegible]	[illegible]	[illegible]-[illegible]	[illegible]
[illegible]-[illegible]	1,[illegible]0	1,[illegible]-1,[illegible]	1,[illegible]7
[illegible]-[illegible]	[illegible]	[illegible]-[illegible]	[illegible]

During the total enrollment for the study from 1,[illegible]7 to
1,[illegible]7, six reports for 1,845 students were observed.

If a child should attend school and remained for three days his
name was included on this enrollment report even though he might
have dropped out of school after attending a short period of time.

In Tables I, II, and III, percentages have been computed for
figure used. While these percentages are valuable in showing
distribution as of any one year, they do not indicate trends be-
cause the enrollment for each year must add up to 100. This
is only true if in one item will automatically make
up for the other items in the [illegible], or
[illegible].

in the rate of blindness from various causes, is the fact that the entire school enrollment is included instead of new admissions only. In the report she prepared for 1941-1942, a total of 4,604 children includes only 639, or less than 14 per cent, new admissions. Hence, a trend towards a reduction in the rate of blindness from any cause may appear significant in an analysis of new cases but scarcely noticeable in a tabulation covering the total enrollment.

She also feels that still another factor which might affect these figures (as it does the percentages for a given year)is the inclusion in the enrollment of most schools of children with too much vision to be considered blind.

While Miss Kerby's studies cover a much wider field than this study, the above-stated factors would, in general, hold true in this study, since the same plan has been used in recording the eye conditions. Therefore, generalizations will be made but trends cannot be indicated by this study.

It is hoped that teachers and workers interested in the welfare of the blind and partially-seeing children in Iowa will find in this paper some information of value to them.

CHAPTER II

TABLE I - Causes of Blindness

All C							
Infec							
11.0							
12.0							
13.0							
14.0							
15.1							
15.2							
15.9							
16.0							
17.1							
17.2							
17.9							
18.0							
19.1							
19.2							
19.9							
20.0							
21.0							
22.0							
27.0							
28.0							
29.0							
Traum							
31.0							
32.0							
33.0							
34.0							
35.0							
38.0							
39.0							
40.0							
49.0							

CHAPTER II

TABLE I - Causes of Blindness

All Causes-By Etiology	No. ...	157		146		150		126		149		164		170		176		197		191	
	Year ...	46-47		45-46		44-45		43-44		42-43		41-42		40-41		39-40		38-39		37-38	
Infectious Diseases		23	14.6	31	21.2	33	22.0	30	23.8	35	23.5	37	22.5	41	24.1	41	23.3	43	21.8	35	18.3
11.0 Diphtheria														1	.6						
12.0 Gonorrhea(excluding O.N.)																					
13.0 Measles														2	1.2	3	1.7	2	1.0	1	.5
14.0 Meningitis				1	.7	1	.7	1	.8	1	.7	1	.6			1	.6	3	1.5	2	1.1
15.1 Ophthalmia Neonatorum-gonorrheal		14	8.9	16	10.9	18	12.0	20	15.8	23	15.4	25	15.2	26	15.2	25	14.2	12	6.1	12	6.3
15.2 Ophthalmia neonatorum-other types																					
15.9 Ophthalmia neonatorum-not specified				1	.7					1	.7	1	.6					10	5.1	6	3.1
16.0 Scarlet fever		1	.6	1	.7	1	.7	1	.8	1	.7	1	.6	1	.6	1	.6	2	1.0	2	1.1
17.1 Septicemia - acute																					
17.2 Septicemia - chronic										1	.7										
17.9 Septicemia - not specified																					
18.0 Smallpox														1	.6	1	.6				
19.1 Syphilis - prenatal		5	3.2	8	5.5	10	6.6	6	4.8	7	4.7	8	4.9	8	4.7	8	4.5	11	5.6	5	2.6
19.2 Syphilis-acquired after birth																					
19.9 Syphilis-not specified										1	.7	1	.6							1.	.5
20.0 Trachoma																					
21.0 Tuberculosis				1	.7			1	.8												
22.0 Typhoid fever																					
27.0 Multiple infectious diseases																				1.	.5
28.0 Other infectious diseases, specified														2	1.2	2	1.1	2	1.0	4	2.1
29.0 Infectious diseases, not specified		3	1.9	3	2.0	3	2.0	1	.8									1	.5	1	.5
Trauma(including chemical burns)		7	4.5	4	2.7	6	4.0	4	3.2	7	4.7	10	6.1	16	9.4	16	9.2	17	8.6	13	6.7
Non-occupational activities																					
31.0 Birth processes		1	.6	1	.7	1	.7	1	.8	1	.7	1	.6	1	.6	1	.6			1	.5
32.0 Medical and surgical procedures														2	1.2	3	1.7	3	1.5	1	.5
33.0 Play or sport		5	3.2	3	2.0	5	3.3	3	2.4	5	3.4	7	4.3	9	5.2	9	5.1	5	2.5	4	2.1
34.0 Household activities																					
35.0 Traffic and transportation		1	.6									1	.6	1	.6	1	.6			1	.5
38.0 Other non-occupational activities,specified																					
39.0 Non-occupational activities, not specified										1	.7	1	.6	2	1.2	1	.6	1	.5	1	.5
40.0 Occupational activities																					
49.0 Activities, not specified														1	.6	1	.6	8	4.1	5	2.6

TABLE I - CAUSES OF BLINDNESS (continued)

TABLE I - CAUSES OF BLINDNESS (continued)

	No.	157		146		150		126		149		164		170		176		197		191	
	Year...	46-47		45-46		44-45		43-44		42-43		41-42		40-41		39-40		38-39		37-38	
Poisonings		1	.6	1	.7	1	.7	1	.8	2	1.3	1	.6							1	.5
51.0 Non-occupational activities		1	.6	1	.7	1	.7	1	.8	2	1.3	1	.6							1	.5
52.0 Occupational activities																					
59.0 Activities, not specified																					
Neoplasms (all types) 69.0)		10	6.4	8	5.5	9	6.0	8	6.3	4	2.7	4	2.4	2	1.2	2	1.1	4	2.0	2	1.1
General Diseases (not elsewhere classified)		4	2.5	3	2.1	5	3.3	5	4.0	6	4.0	5	3.0	5	3.0	5	2.9	5	2.5	5	2.7
71.0 Anemia and other blood diseases								1	.8	1	.7	1	.6	1	.6	1	.6				
72.0 Diabetes																					
73.0 Nephritis and other kidney diseases																					
74.0 Vascular diseases								1	.8	1	.7	3	1.8								
75.0 Diseases of the central nervous system		3	1.9	3	2.1	4	2.6	3	2.4	3	2.0			1	.6	1	.6	1	.5		
76.0 Diseases of pregnancy and childbirth																					
77.0 Nutritional deficiency		1	.6			1	.7			1	.7	1	.6	2	1.2	2	1.1	3	1.5	2	1.1
78.0 Other general diseases specified														1	.6	1	.6			1	.5
79.0 General diseases, not specified																		1	.5	2	1.1
Prenatal Origin (not elsewhere classified)		96	61.2	88	60.3	83	55.3	66	52.4	79	53.0	87	53.0	83	48.8	89	50.6	73	37.1	61	32.0
81.0 Hereditary origin, established		5	3.2	5	3.4	5	3.3	1	.8					5	3.0	3	1.7	3	1.5	2	1.1
82.0 Hereditary origin, presumed		15	9.6	10	6.8	15	10.0	12	9.5	14	9.4	15	9.1	17	10.0	16	9.1	19	9.6	16	8.4
89.0 Prenatal origin, cause not specified		76	48.4	73	50.	63	42.0	53	42.1	65	43.6	72	43.9	61	35.8	70	39.7	51	25.9	43	22.5
Etiology Undetermined or Not Specified		16	10.2	11	7.5	13	8.7	12	9.5	16	10.7	20	12.2	23	13.5	23	13.0	55	28.0	74	38.7
91.0 Unknown to science		2	1.3	1	.7	2	1.3	5	4.0	6	4.0	7	4.3	2	1.2	3	1.7	2	1.1		
92.0 Undetermined by physician		13	8.3	8	5.5	9	6.0	7	5.5	10	6.7	13	7.9	20	11.7	18	10.2	19	9.6	31	16.2
99.0 Not specified		1	.6	2	1.4	2	1.3							1	.6	2	1.1	34	17.3	43	22.5

CHAPTER II.

A Comparison Over the Ten-Year Period of All Causes by Etiology.

Seven main classifications are listed under the heading "All Causes - By Etiology". They are as follows: Infectious Diseases, Trauma (including chemical burns), Poisonings, Neoplasms (all types), General Diseases (not elsewhere classified); Prenatal Origin (not elsewhere classified), and Etiology Undetermined or Not Specified.

According to the percentages charted under "infectious diseases" the peak year was 1940-1941 with 24.1 per cent. It is interesting to note that with the large enrollment in 1946-1947 this per cent had dropped to 14.6. While only 18.3 per cent is recorded for 1937-1938 it seems highly probable that some cases which might have been charted under "infectious diseases" are under "undetermined by the physician" or "not specified" since the figures under these categories are exceptionally high.

In her seventh annual summary, Miss Kerby states that for the year 1939-1940 about one fourth (23.8 per cent) of blindness in children is seen to be due to the "infectious diseases".[3]

One case of blindness was listed as being due to diphtheria in 1940-1941.

In the first four years, measles was given as the cause of visual impairment in from one to three cases. While none

are listed for the later years it has been interesting to note in recent literature, information concerning the possibility of German measles being the cause of congenital cataracts if the mother contracts the disease during the first few months of pregnancy. (This will be discussed further under the heading of Cataracts.)

Meningitis was given as the cause of from one to three cases of blindness in most years.

It is disturbing to note that ophthalmia neonatorum (gonorrheal) was the cause of over 15 per cent of the blindness in Iowa from 1940 to 1944. The encouraging fact here is that the per centage was reduced to 8.9 in 1946-1947. During the first two years of the study gonorrhea was listed for only 6.3 per cent and 6.1 per cent,but 3.1 per cent and 5.1 per cent were given under "ophthalmia neonatorum - not specified". Since many of the records for the first few years gave little information, it is possible that at least a portion of these should have been included under gonorrhea.

In checking the cases of the students having ophthalmia neonatorum and the time and place of birth, it was noted that four were born out of the state of Iowa; five were born in Johnson County and five were born in Woodbury County. Of the five born in Johnson County four were born in a hospital. Of the five born in Woodbury County two were born in hospitals. Of the entire group for the ten-year period of study the records of only seven stated that the child had been born in a hospital.

Two records definitely stated that putting drops in the eyes had been omitted at the birth of the baby. One stated that infection had set in a few days after birth through carelessness of the mother. Some records stated that the child was born blind, or that blindness was first noticed at nine or ten months, or that an eye defect was noted by the parents in early infancy. The three most recent cases were of children born in 1934, 1936, and 1937.

While at least nine of the students listed for the ten-year period of study were enrolled for the entire ten years and four were enrolled for nine years, there are at least eleven students who will still be enrolled for 1947-1948 unless some drop out. Of these eleven, three are in the lower grades. One of the three entered the Iowa School for the Blind during 1945-1946.

According to a paper written by Dr. Frank Allport in 1916, the following was said about "State Legislation Concerning Ophthalmia Neonatorum".

> Section 1. Should one or both eyes of an infant become inflamed, or swollen, or reddened at any time within two weeks after its birth, it shall be the duty of the midwife, parent, guardian, or nurse, or other persons having charge of such infant to report within six (6) hours after the discovery thereof by such person in charge of such infant to the health officer or some legally qualified practitioner of the city, town or district in which the parents of the infant reside, the fact that such inflammation, or swelling, or redness of the eyes exists.
>
> Section 2. It is hereby made the duty of the attending physicians or midwives to instruct parents and nurses in regard to the provisions of this act and the danger of sore eyes in infants.

> Section 3. Any failure to comply with the provisions of this act shall be punished by a fine of not less than twenty-five dollars, or imprisonment in the county jail not to exceed 30 days or both.[4]

State legislation is needed; no doubt, but along with legislation we need public education and understanding so that people will know what should be done.

Dr. F. Park Lewis stated this as early as 1910:

> From an economic standpoint would it not pay the municipality and the State to stop blindness, which costs so much, by the adoption of means which cost so little? We are only now beginning to learn that in all phases of preventive medicine, our strongest, our most necessary, and indeed our essential ally, is the public, and the needed stimulus to better medical performance is an intelligent knowledge on the part of the people as to what should be done.[5]

He continues with the idea that is well-established today, that gonococcus was responsible for a great majority of the cases. At that time it was felt that right prophylaxis was generally effective and that the correct use of the one per cent solution of silver nitrate should greatly reduce the amount of blindness due to babies' sore eyes.[6]

In 1947, Dr. Brittain Payne who is a clinical professor of ophthalmology at New York University wrote:

> The presence of infections such as gonorrheal and inclusion conjunctivitis immediately after birth become less and less evident as we continue to improve our technique of delivery and infant care. It was only a few years ago that gonorrhea accounted for many of our blind children. About two decades ago, the New York Eye and Ear Infirmary had a pavilion devoted to such infections as gonorrhea and trachoma. Today, that pavilion is closed and is being used for orthoptic training. The outstanding contribution to the prevention of blindness from infections was the successful campaign to compel the use of silver nitrate in the eyes of infants at birth. Now that penicillin and the sulfonamide drugs are available and almost specific there is little cause for loss of sight from these infections.[7]

Section 5. Any failure to comply with the provisions of this act shall be punished by a fine of not less than twenty-five dollars, or imprisonment in the county jail not to exceed 30 days or both.

It is legislation is needed; no doubt, but along with legislation we need public education and understanding so that people will know what should be done.

Dr. T. Mark Lewis stated this as early as 1927:

> Even an economic standpoint would it not pay the municipality and the State to stop blindness, which costs so much, by the practice of young which o to do little? We are only now beginning to learn that in all phases of preventive medicine, our strongest, our most necessary, and indeed our essential ally, is the public, and the needed stimulus to better medical performance is an intelligent knowledge on the part of the people as to what should be done.

He continues with the idea that in well-enforced today, that pronouncement was responsible for a great majority of the cases. At that time it was felt that right prophylaxis was generally effective and that the correct use of the one per cent solution of silver nitrate should greatly reduce the amount of blindness due to babies' sore eyes.

In 1947, Dr. Pritchett Terry who is a clinical professor

> of infections such as proposed and
> evident as we continue to improve
> delivery and infant care. It was only
> two decades ago, the New York Eye
> Infirmary had a pavilion devoted to such infections
> and illness. Today, that pavilion is closed
> for lack of patients to claim. The unfortunate
> blindness of the present is about the use of silver
> nitrate by the crowd of infants at birth. For that prophylaxis
> the eyes are completely free and clear
> [illegible] for lack of [illegible]
> [illegible].

A colorful article was recently written by Miriam Zeller Gross, suggesting that our present laws requiring the use of drops of silver nitrate at the birth of a child might well be the cause of that child's blindness. It is her contention that doctors have long known the dangers of this drug but required its use, since in the earlier years it was the only known drug with which to combat the gonorrhea germs. She is of the opinion that "such measures are unnecessary, now that we have drugs like penicillin which cannot only fight infection more effectively than silver nitrate but are harmless to a baby's delicate eyes". She feels that the hands of the physicians are tied since in forty states they are required by law to use silver nitrate drops. Her suggestion is that since legislation does move slowly the best scientific answer might be to treat infected mothers adequately with penicillin before their babies are born.[8]

Even though Iowa has dropped from a high percentage of 26.3 in 1914-1915[9] to the present 8.9 in 1946-1947, there is no reason to think that ophthalmia neonatorum due to gonorrheal infection is no longer a matter of concern. As long as a single child's name remains on the record under ophthalmia neonatorum, preventive measures should be practiced.

During the first two years of the study two cases were recorded as having become blind due to scarlet fever. For the other eight years only one name remained on the record.

Smallpox was recorded as a cause of blindness for one case in 1939-1940 and in 1940-1941.

The highest rating for prenatal syphilis as a cause of blindness was 6.6 per cent in 1944-1945. The following year it dropped to 5.5 per cent with a decline to 3.2 per cent in 1946-1947. It is interesting to note that the lowest percentage (2.6) is given for the first year of the study. However, for that same year .5 per cent is listed under "syphilis-not specified." No doubt other cases are concealed in "etiology undetermined or not specified".

For 1939-1940 in the report of eye conditions for the United States syphilis is listed as causing 4.7 per cent of the blindness.[10] In 1940-1941 it caused 5.0 per cent.[11] Cases due to syphilis showed a decrease in 1942-1943.[12] In 1939-1940 Iowa showed 4.5 per cent. In 1940-1941 the figure was 4.7 per cent. And in 1942-1943 it remained at 4.7 per cent. These percentages compare favorably with the national ratings, but during the three following years there is a definite increase which should cause some concern.

In checking back through the eye reports it was found that one student having syphilis as the cause of his blindness was enrolled for the entire time of the study; another was enrolled for nine years; and two others were enrolled for eight years. The others were enrolled for shorter periods of time. Two were from Polk County and two from Muscatine County. One was born out of the State of Iowa. The remainder were from scattered

counties throughout the state.

It is possible that the inauguration of sight saving classes in 1943-1944 and succeeding years might account for part of the increase in the recent years of the study. At least one case can be accounted for in this manner for 1943-1944; three for 1944-1945 and 1945-1946; and one for 1946-1947.

Of the group studied the youngest pupils were born in 1930, 1931, 1934, 1937 and 1939.

With fourteen free venereal disease clinics in the state, the people living in the more densely populated areas should have access to the preventive assistance they require. In counties where there are no clinics, the state provides the necessary medication and the county supervisor aids in paying for the treatment.

Although Iowa has a prenatal law, making it compulsory for every expectant mother to have a blood test, and a state law requiring a pre-marital blood test, there still are loop-holes, in that some of the bordering states do not have these laws. Emphasis still needs to be laid on prevention through education.

13

No cases of trachoma were recorded for this ten-year study.

In the earlier years of the study several cases of"other infectious diseases, specified" are recorded. It is unfortunate that in the recent years of the study several are listed under "infectious diseases, not specified."

The peak years for "trauma (including chemical burns)" were 1940-1941, 1939-1940, and 1938-1939 with 9.4 per cent, 9.2 per cent and 8.6 per cent respectively. The lowest years

were 1943-1944)3.2 per cent) and 1945-1946 (2.7 per cent).

Trauma due to birth processes produced one case for all the years with the exception of 1938-1939. Traffic and transportation claimed one case for five of the ten years. Under "non-occupational activities, not specified" one or two cases are listed in the six earlier years of the study. In the first two years of the study there are 2.6 per cent and 4.1 per cent under "activities, not specified" but none are recorded for the last six years.

Trauma due to play or sport has the highest percentage with 5.2 and 5.1 per cent in 1940-1941 and 1939-1940 respectively. The lowest was in 1945-1946 with 2.0 per cent. In 1946-1947 there was an increase to 3.2 per cent.

In comparing Iowa's highest percentage with that of the United States for the same year, it was found that trauma was responsible for 9.4 per cent of the total cases of blindness in Iowa in 1940-1941 and for 7.9 per cent in the United States.[14]

Miss Kerby notes that a detailed analysis of the cases having trauma listed under "play or sport" shows that sharp or pointed objects are the chief agents involved; with various types of explosives (including guns, fireworks, and dynamite caps) second; and blows or falls, third.[15]

In 1935 a definite campaign was begun to prevent accidents on the Fourth of July. At a conference held by the National Society for the Prevention of Blindness in that particular year, Mr. Louis Resnick, Director of Industrial Relations, said that at least 7,738 persons were injured, and 30 persons were killed in celebrating the Fourth of July that year with fireworks and the accompanying paraphernalia, such as matches and bonfires.

Transue Bay to Birch Mountains would one open for all
the years with the exception of 1951-1955. Specific and tempo-
rarily closed the open Bay . The two years. Many
"non-commercial activities, not already" open the open
and limited in the six months' time of the . In this first
two years of the study from one's first one "I pay only
under "activities, not fully" but open any open and for this
last six years.

Prawns due to July on short one the highest commercial
$.5 and $.7 per count in Lake-Trout and 1951-1960 respectively.
The lowest was in 1962-1963 with $.4 per count. In 1963-1
there was an increase to $.6 per count.

In comparing Jones's latest report with that of Big
Mound Station for the same years, it can then that there was
an increase in fish per net over that of Jones in
Jones in 1960-1961 and then 0.9 were gain in the Island Station.

The Perry notes that a decline in quality of the upper
portion though listed below "Low or a net" please check as to the
stated options are the chief results follow: With various

Sparklers alone caused 90 casualties the previous Fourth of July.[16]

At this same conference it was suggested that the control of dangerous fireworks requires regulations as well as education for you cannot induce an element of youth to forego such items as long as they are offered for sale.[17]

From a summary of legislation controlling the sale and use of fireworks in the United States as of 1942, it is found thirteen states have a prohibitory type of law and eight have a regulatory law. The prohibitory legislation forbids all sale or use of fireworks except for necessary industrial or military purposes or in public displays by competent operators who are licensed. The regulatory legislation may forbid sale to or use by specific groups (as minors), or may exempt from restrictions certain so-called "harmless" varieties of fireworks.

Iowa has a prohibitory law.[18] How much credit for decrease in trauma as a cause of blindness in recent years can be given directly to this legislation would be difficult to determine, since many of the records do not definitely state the cause. However, it no doubt has been of considerable assistance.

From one to two cases of blindness were listed as being due to poisoning, all of which were "non-occupational activities."

There has been a decided increase in the number of neoplasms in recent years. In the seventh annual summary of causes of blindness in the United States, it was stated that neoplasms, particularly brain tumors, were worthwhile noticing,

since they constituted 2.8 per cent of the total.[19] In the Iowa report there is a jump from 1.1 per cent in the first year of the study to 6.4 per cent in the last year. The greatest increase was between 1942-1943 and 1943-1944 when the figure advanced from 2.7 per cent to 6.3 per cent. This would seem to indicate that medical science today is able to save a number of cases which sometime ago would have been hopeless.

Dr. Brittain Payne made the following statements concerning tumors:

> The most common and fatal tumor of infancy is the highly malignant retinoblastoma or tumor of the retina which not only destroys sight but kills the patient unless recognized early and eliminated. The characteristic dilated pupil with the yellowish mass behind it is one of the late signs but often the mother or nurse finds that the child does not see and has the eye examined. If the tumor is discovered early enough there is hope of maintaining vision and saving the life of the child.[20]

Under the classification of "general diseases (not elsewhere classified)" there seems to be no outstanding number of cases under any one item. It does seem surprising though to find as many cases under "nutritional deficiency" as there are.

A very large percentage of the causes of blindness comes under the heading of "prenatal origin" with 61.2 per cent for 1946-1947.

"Etiology undetermined or not specified" still rates too high, with 10.2 per cent in 1946-1947; but it has dropped from 38.7 per cent in the first year of the study to 28.0 per cent in the second year and from that to a low of 7.5 per cent in 1945-1946.

CHAPTER III

A Comparison Over the Ten-Year Period of All Causes by Site (Topography) and Type of Affection

In glancing through this study from 1937 to 1947 and noting the percentages of causes of blindness as given for the various parts of the eye, it would seem in general that these percentages were considerably higher in the middle and later years than in the first two years of the study. Upon more careful analysis it is obvious that in the first few years there was a number of miscellaneous and ill-defined causes of blindness. The eye records for the first two years in particular were very incomplete.

Affections of the eyeball in general caused 40.5 per cent of the blindness for 1945-1946, and only 12.0 per cent in 1937-1938. High percentages for 1945-1946 come under refractive errors, albinism, buphthalmos, and multiple structural anomalies. While part of this increase might be due to the addition of sight saving classes in the school, it would seem that it is due more to the better records kept for all causes. No one particular cause has the highest percentage for every year of the ten year period, but the previously mentioned ones are high.

Breaking the causes down from the main headings, it is interesting to note that cases of glaucoma are recorded for only the first three years. Realizing that this is a study of school children and that glaucoma is a disease of middle and advanced life, occurring generally between forty and seventy, it is surprising that any are listed. In looking over further on the chart

Problem III

A Comparison Over the Two-Year Period of All Deaths by Site (Percentage) and Type of Affection

In planning [illegible] study [illegible] to [illegible] and mother's [illegible] parameters of course of diseases as given for the various parts of the eye, it would seem in general that these parameters were considerably lower in the adults and later years than in their first two years of the study. Upon some careful analysis it appears that in the first few years there was a tendency for [illegible] and ill-defined causes of blindness. The eye records for the first two years in particular were [illegible].

Attention of the special in general caused [illegible] of the diseases for 1942-1943, and only 35.0 per cent [illegible] edema, dilation, degeneration, and multiple unnoticed [illegible]. With part of this increase right to due to the addition of [illegible] disease in the record, it would seem that it is due [illegible] the better reporting [illegible] to the [illegible] [illegible] the [illegible] [illegible] [illegible]

TABLE II - CAUSES OF BLINDNESS

All Causes by Site (Topography) and type of Affection		Eyeball in General	Hyper-tension (Glaucoma)	Refrac. errors: Myopia (Incl. myopic astigmatism	Refrac. errors: Other refractive errors, specified
No. & %	Year				
157	46-47	59		12	6
100.0		37.6		7.7	3.8
146	45-46	59		8	7
100.0		40.5		5.5	4.8
150	44-45	58		6	5
100.0		38.7		4.0	3.3
126	43-44	49		9	1
100.0		38.8		7.1	.8
149	42-43	56		10	3
100.0		37.6		6.7	2.0
164	41-42	64		14	4
100.0		39.0		8.5	2.4
170	40-41	62		11	5
100.0		36.5		6.5	2.9
176	39-40	54	1	10	5
100.0		30.7	.6	5.7	2.8
197	38-39	31	2	7	3
100.0		15.7	1.0	3.6	1.5
191	37-38	23	2	4	1
100.0		12.0	1.1	2.1	.5

TABLE II - CAUSES OF BLINDNESS (continued)

All Causes by Site (Topography) and Type of Affection		Structural Anomalies								
		Albinism	Anophthalmos (exludg. surgical)	Megalophthalmos (buphthalmos)	Microphthalmos	Aniridia	Coloboma, any part ex.sur.	Multiple struc. anomalies	Other struc. anomalies specified
No & %	Year								
157 100.0	46-47	5 3.2		12 7.7	2 1.3	3 1.9		12 7.6	1 .6
146 100.0	45-46	8 5.5	1 .7	9 6.2	2 1.4	2 1.4		15 10.3	
150 100.0	44-45	9 6.0	1 .7	12 8.0	1 .7			15 10.0	1 .7
126 100.0	43-44	2 1.6	2 1.6	8 6.3			1 .8	13 10.3	2 1.6
149 100.0	42-43	3 2.0		7 4.7				17 11.4	2 1.3
164 100.0	41-42	2 1.2		8 4.9			2 1.2	16 9.8	2 1.2
170 100.0	40-41	2 1.2	1 .6	8 4.7	5 2.9		5 2.9	13 7.6	1 .6
176 100.0	39-40	1 .6	2 1.1	7 4.0	5 2.8		5 2.8	7 4.0	1 .6
197 100.0	38-39	2 1.0	1 .5	3 1.5		1 .5	1 .5	5 2.6	
191 100.0	37-38	2 1.1	2 1.1	3 1.6	1 .5	1 .5	1 .5	2 1.1	

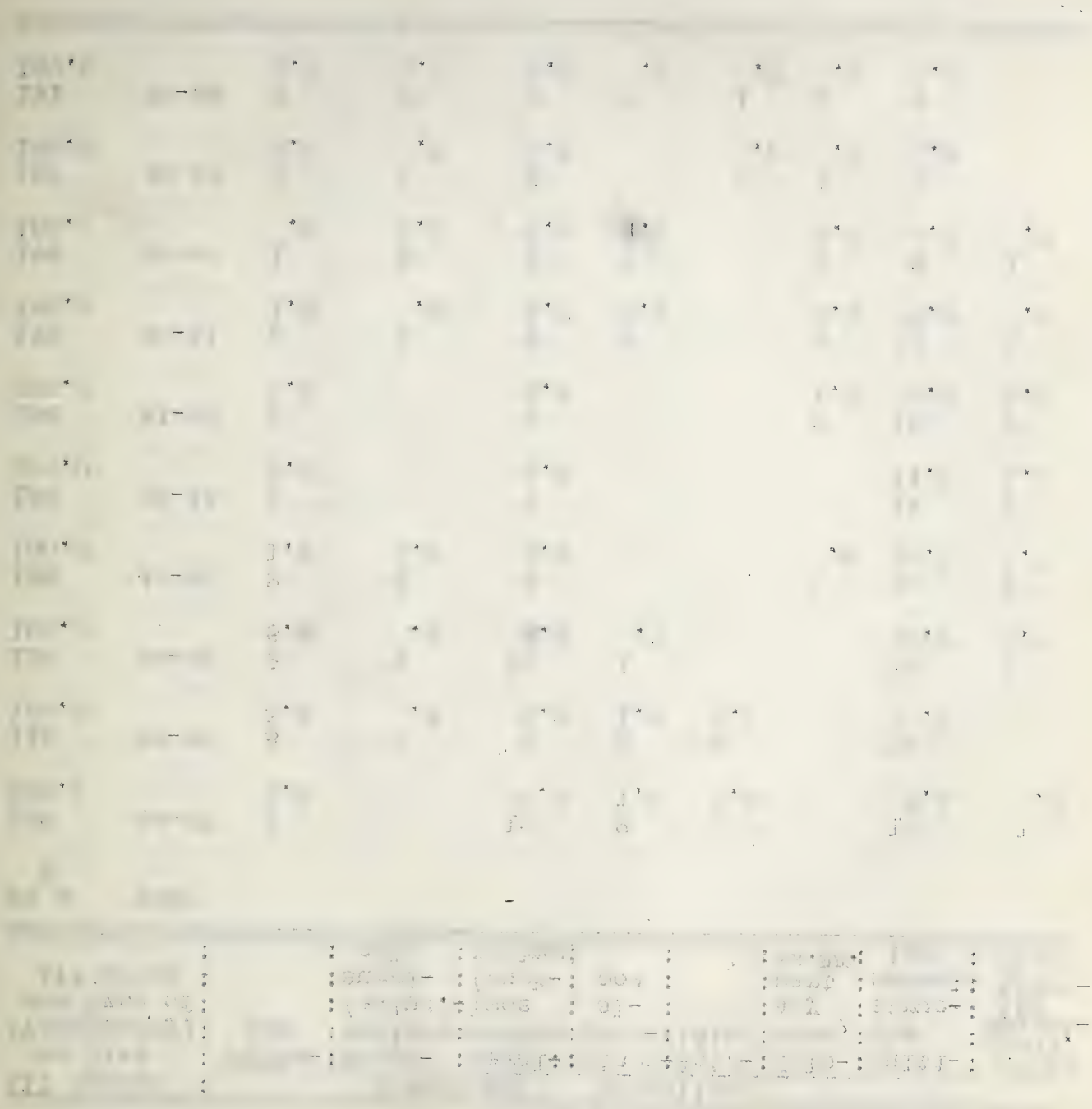

TABLE II - CAUSES OF BLINDNESS (continued)

All Causes by Site (Topography) and type of Affection		Degen. Changes Disorganized, atrophic, phthisic eyeball	Other affections of the eyeball specified	Affections of the eyeball not specified	Conjuctiva, Muscles, and Other Ocular Adnexa (200)
No. & %	Year				
157 100.0	46-47	3 1.9		3 1.9	
146 100.0	45-46	4 2.7		3 2.0	1 .7
150 100.0	44-45	7 4.6		1 .7	1 .7
126 100.0	43-44	8 6.3		3 2.4	2 1.6
149 100.0	42-43	10 6.7	1 .7	3 2.0	2 1.3
164 100.0	41-42	12 7.3	1 .6	3 1.8	2 1.2
170 100.0	40-41	11 6.5			2 1.2
176 100.0	39-40	9 5.1		1 .6	2 1.1
197 100.0	38-39	3 1.5	1 .5	2 1.0	5 2.6
191 100.0	37-38	3 1.6	1 .5	1 .	2 1.1

TABLE II - CAUSES OF BLINDNESS (continued)

All Causes by Site (Topography) and Type of Affection		Cornea	Keratitis, Interstitial	Keratitis Keratoconjunc. phlyctenular	Keratitis ulcerative	Keratitis not specified	Other affections of the cornea specified
No. and Year %							
157 100.0	46-47	15 9.6	5 3.2		9 5.7		
146 100.0	45-46	18 12.3	6 4.1		10 6.8		
150 100.0	44-45	18 12.0	7 4.6	1 .7	9 6.0		
126 100.0	43-44	16 12.7	4 3.2		10 7.9		
149 100.0	42-43	22 14.8	7 4.7	1 .7	12 8.1		
164 100.0	41-42	24 14.6	7 4.3	1 .6	13 7.9	1 .6	
170 100.0	40-41	22 12.9	7 4.1	1 .6	8 4.7	1 .6	4 2.3
176 100.0	39-40	19 10.8	7 4.0	1 .6	6 3.4	1 .6	3 1.7
197 100.0	38-39	18 9.1	6 3.0		5 2.6	3 1.5	2 1.0
191 100.0	37-38	11 5.8	2 1.1		4 2.1	2 1.1	1 .5

TABLE II - CAUSES OF BLINDNESS (continued)

All Causes by Site (Topography) and Type of Affection		Affections of the cornea specified	Iris and Ciliary Body	Iritis	Iridocyclitis and uveitis	Keratoiritis	Sympathetic ophthalmitis
No. and Year							
%							
157	46-47	1	6		3	1	2
100.0		.6	3.8		1.9	.6	1.3
146	45-46	2	6		3	2	1
100.0		1.4	4.1		2.0	1.4	.7
150	44-45	1	6		3	2	1
100.0		.7	4.0		2.0	1.3	.7
126	43-44	2	6		4	1	1
100.0		1.6	4.8		3.2	.8	.8
149	42-43	2	8		4	1	3
100.0		1.3	5.4		2.7	.7	2.0
164	41-42	2	10		3	1	6
100.0		1.2	6.1		1.8	.6	3.7
170	40-41	1	14		3	4	7
100.0		.6	8.2		1.8	2.3	4.1
176	39-40	1	14		3	4	7
100.0		.6	8.0		1.7	2.3	4.0
197	38-39	2	4		3		1
100.0		1.0	2.0		1.5		.5
191	37-38	2	5		4		1
100.0		1.1	2.6		2.1		.5

TABLE II - CAUSES OF BLINDNESS (continued)

All Causes by Site (Topography) and Type of Affection		Crystalline Lens	Cataract	Dislocated Lens	Choroid and Retina	Retinitis	Chorioretinitis	Detached retina
No. and Year %								
157	46-47	31	28	3	20	1	7	3
100.0		19.7	17.8	1.9	12.7	.6	4.5	1.9
146	45-46	23	19	4	17	2	5	2
100.0		15.8	13.0	2.7	11.6	1.4	3.4	1.4
150	44-45	23	20	3	18	1	5	2
100.0		15.3	13.3	2.0	12.0	.7	3.3	1.3
126	43-44	16	14	2	13	3	3	1
100.0		12.7	11.1	1.6	10.3	2.4	2.4	.8
149	42-43	23	19	4	14	4	2	1
100.0		15.4	12.8	2.7	9.4	2.7	1.3	.7
164	41-42	24	20	4	16	4	3	1
100.0		14.6	12.2	2.4	9.8	2.4	1.8	.6
170	40-41	25	21	4	13	2	2	
100.0		14.7	12.4	2.3	7.6	1.2	1.2	
176	39-40	27	24	3	14	2	3	
100.0		15.3	13.6	1.7	8.0	1.1	1.7	
197	38-39	25	23	2	12		4	
100.0		12.7	11.7	1.0	6.1		2.0	
191	37-38	31	29	2	12		6	
100.0		16.2	15.2	1.1	6.3		3.1	

TABLE II - CAUSES OF BLINDNESS (continued)

All Causes by Site (Topography) and Type of Affection		Retinal Degeneration, (incl. Pigmen.)	Other affections of choroid and retina	Affections of choroid and retina, not specified	Optic nerve, Vis. Path. and Cort. Vis. centers	Optic Nerve Atrophy	Optic neuritis (papillitis
No. and Year							
	%						
157	46-47	7	2		22	13	1
100.0		4.5	1.3		14.0	8.3	.6
146	45-46	6	2		17	9	1
100.0		4.1	1.4		11.6	6.2	.7
150	44-45	7	3		20	13	1
100.0		4.7	2.0		13.3	8.6	.7
126	43-44	5	1		19	9	1
100.0		4.0	.8		15.1	7.2	.8
149	42-43	7			18	10	1
100.0		4.7			12.1	6.7	.7
164	41-42	8			17	12	1
100.0		4.9			10.4	7.3	.6
170	40-41	7	2		21	16	1
100.0		4.1	1.2		12.4	9.4	.6
176	39-40	7	2	1	22	19	1
100.0		4.0	1.1	.5	12.5	10.8	.6
197	38-39	5	2	1.5	17	16	
100.0		2.6.	1.0	.5	18.6	8.1	
191	37-38	3	3		20	18	
100.0		1.6	1.6		10.5	9.4	

TABLE II - CAUSES OF BLINDNESS (continued)

All Causes by Site (Topography) and Type of Affection		Papilledema (choked disc)	Neuroretinitis	Retrobulbar and intracranial lesions	Misc. and ill-defined	Amblyopia, undefined	Other misc. & ill-defined lesions spec.	Lesions not specified
No. and Year	%							
157	46-47	1	1	6	4	4		
100.0		.6	.6	3.8	2.6	2.6		
146	45-46		1	6	5	5		
100.0			.7	4.1	3.4	3.4		
150	44-45		1	5	6	6		
100.0			.7	3.3	4.0	4.0		
126	43-44		1	8	5	5		
100.0			.8	6.3	4.0	4.0		
149	42-43		2	5	6	6		
100.0			1.3	3.4	4.0	4.0		
164	41-42		1	3	7	7		
100.0			.6	1.8	4.3	4.3		
170	40-41		1	3	11	10	1	
100.0			.6	1.8	6.5	5.9	.6	
176	39-40		1	1	24	16	5	3
100.0			.6	.6	13.6	9.1	2.8	1.7
197	38-39			1	85	18	24	43
100.0				.5	43.2	9.2	12.2	21.8
191	37-38			2	87	13	27	47
100.0				1.1	45.5	6.8	14.1	24.6

it will be observed that megalophthalmos (buphthalmos) shows a high percentage, beginning with the third year of the study and continuing through the tenth year.

Dr. Riemer suggests that glaucoma may occur at any age but is most frequent after middle life.[22] Buphthalmos is an uncommon disease of early childhood, either congenital or developing in infancy, and usually involving both eyes. It is due to an interference with the filtration of fluid from the eye because of congenital defects of the angle of the anterior chamber and the canal of Schlemm. There is more or less increase of intraocular tension which, on account of the yielding character of the sclera at this period of life, causes marked enlargement of the eyeball. The disease progresses slowly. Although in some cases it comes to a stop with fairly good vision remaining, it generally leads to blindness.[23]

According to Dr. Riemer, glaucoma is not caused or made worse by using the eyes. Reading, sewing, writing, playing cards and going to movies are not harmful; but he urges having good light, good conditions, and good print.[24]

That which might have been expected does not prove true, when one looks at the data concerning refractive errors. It might have been assumed that with the introduction of a sight saving class in 1943-1944 there would be an increase in myopes and hyperopes. Combining the percentages of refractive errors the peak year is found to be 1946-1947, with 11.5 per cent; next in line is 10.9 per cent in 1941-1942, and then 10.3 per cent in 1945-1946. In the first two years after the introduction of sight saving work (1943-1944 and 1944-1945) there was actually

a decrease in the percentages of cases with refractive errors.

Another factor which no doubt entered in here was the fact that the oculist in the early years of the sight saving program was reluctant to include the high myopes in the classes with other partially seeing children.

Mrs. Winifred Hathaway has very nicely summed up the diversified opinions concerning the placement of myopes. She states that some ophthalmologists are of the belief that myopia is due to a hereditary tendency to abnormal growth of the eyeball and therefore using the eyes will have no ill effects on the growth. They think it is permissible to let even highly myopic children use their eyes to the extent of doing regular school work. Others believe that using the eyes intensively causes the eyeball to increase in depth, so they recommend the avoidance of all work requiring close use of the eyes. Some think of myopia as merely a refractive error, while others consider it a systemic difficulty that might possibly be counteracted through treatment. Others believe age needs to be considered. Normally, younger children are hyperopic; if they show some degree of myopia when they are young, the defect should be considered more serious than the same degree when the child is sixteen or seventeen.

Many oculists feel that it is wise to place the young child with a high degree of myopia in a class for the partially seeing where there will be a teacher with special training who will

understand his needs.

Mrs. Hathaway is of the opinion that high hyperopes require much patience for they tire quickly when using their eyes for

close work. Materials in large, clear type that can be read at a greater distance than normal will prove helpful. Short periods of required concentration will assist the hyperope.[26]

Albinism is an interesting affection. It is a congenital and hereditary deficiency of pigment, associated with lowered visual acuity, nystagmus, and photophobia, and often accompanied by refractive errors.[27] The incidence of albinism is estimated as one case among 10,000 persons; it is more common in dark than in fair races.[28]

The most cases recorded in the Iowa enrollment were nine in 1944-1945. This number dropped to eight the following year and to five in 1946-1947. In the first seven years the greatest number of cases for any given year was three.

There is a very small percentage of anophthalmos (absence of a true eyeball) and microphthalmos (abnormally small eyeball).

No cases of aniridia (congenital absence of the iris) were recorded for six of the ten years. There were five cases of coloboma for 1939-1940 and 1940-1941. Coloboma is a congenital cleft due to the failure of the eye to complete growth in the part affected.

As the oculists made more detailed reports more cases came under the heading of "multiple structural anomalies". "Disorganized, atrophic, phthisic eyeball" claims as high as 7.3 per cent of the cases for 1941-1942. Several other cases are probably included under "other affections of the eyeball, specified" and under those "not specified".

There are two cases listed for six years under "conjunctiva, muscles, and other ocular adnexa". In 1938-1939 five cases were

recorded, while none were listed for the last year.

Affections of the cornea show the highest percentages throughout the middle years of the study and taper off somewhat in the last four years. Most of the cases in this section came under one of the headings of keratitis.

For six years the percentages under interstitial keratitis ran anywhere from 4.0 to 4.7. This defect is worthy of special consideration. Dr. Payne makes the following comments concerning it:

> Syphilis of the eye may manifest itself as congenital or acquired but it is extremely rare that we see an acquired lesion in the eye of an infant. Syphilis affects the eye in at least one-third of all congenital cases of the disease unless it is properly treated. The disease may wait for years to assert itself, or it may be evident at birth. The most common manifestation is interstitial keratitis, which is usually seen from the fourth to the twentieth year but may occur in adult life. Interstitial keratitis is characterized by "clouding of the cornea". It usually affects both eyes in spite of treatment. [29]

There are three preventive measures which Mrs. Hathaway would require. They are: (1) premarital examination; (2) examination of the prospective mother, and treatment if necessary, at least five months before the child is born; and (3) a medical examination of all babies to detect early the presence of any infection.[30]

Social workers, nurses, and teachers should keep in mind that an inflammation may flare up even in a quiescent form. The afflicted child should not attend school if the disease is in a communicable form. It is hoped that through early discovery and regular treatment the condition may clear up.

In phlyctenular keratitis little phlyctenules or small red projections form ulcers that appear on the cornea or conjunctiva. Very often this keratitis is accompanied by lacrimation and photophobia. This eye difficulty is often seen in undernourished children. A child with phlyctenular keratitis is usually a sick child requiring rest and treatment in accordance with the underlying cause. Many physicians believe it to be a tubercular condition and recommend the same treatment that is given in other forms of this disease.[31]

A large number of the cases of keratitis are listed under "ulcerative keratitis" with the highest percentages recorded for 1942-1943 and the succeeding and preceding years. In checking the cross classification of the national figures for 1941-1942, it is seen that the greatest number of cases of ulcerative keratitis fall in line with "ophthalmia neonatorum, not specified" and the next highest with "ophthalmia neonatorum, gonorrheal". The national figure for that year was 7.6 per cent while Iowa had 7.9 per cent and 8.1 per cent for the following year.

Diseases of the iris and ciliary body show an increase in percentage from 2.0 per cent in 1938-1939 to 8.0 per cent in the following year. Possibly this apparent increase is due to a better classification of the eye defects for that and following years.

The cases of iridocyclitis and uveitis remained almost constant at three or four for the ten-year period. There were four cases of kerato-iritis in 1939-1940 and 1940-1941, and only one for 1946-1947. None were recorded for the first two years but that again was probably due to poorer classification.

The following paragraphs give a general idea of sympathetic ophthalmitis.

Sympathetic ophthalmitis is a serous or plastic inflammation of the uveal tract in one eye due to the effects of a similar inflammation in the other.

This inflammation is frequently due to a traumatic iridocyclitis of the first eye as the result of an injury. Foreign bodies that remain in the eyeball often excite this disease.

Sympathetic ophthalmitis is far less frequent now than formerly, due to skill in the treatment of the perforating wounds and more care in antiseptic precautions. There is less hesitation in removing an injured eye when conditions warrant it. It usually begins four to eight weeks after the injury in the exciting eye. The injured eye is known as the exciting eye 32 and the other as the sympathizing eye.

While a cross classification was not attempted for the Iowa report, the high years for blindness caused by "play or sport" correspond with the highest percentages listed for "sympathetic ophthalmitis". This checks also with the national figures.

Cataracts make up the major portion of difficulties recorded under "crystalline lens". There are two main classifications of cataracts, namely: senile cataract, and congenital cataract. The senile cataract is the one commonly seen in adults after they are fifty. In this form the lens becomes hard and opaque and does not respond to the action of the ciliary muscles. When an operation is performed on a senile cataract

the lens is removed and an artificial lens in the form of glasses performs its function.

The congenital cataract is the kind commonly seen in classes for children with partial vision or in schools for the blind. In this type the contents of the lens failed to become clarified in the prenatal stage and are soft and cloudy. The operation performed on this type of cataract is known as needling or dicission - a process by which openings are made through the lens capsule. As the lens swells and protrudes through this opening, portions of it fall into the anterior chamber and are absorbed by the aquecus. The entire duration of treatment is several months, since a number of needlings are necessary. After all signs of irritation have disappeared, glasses are prescribed to take the place of the lens.[33]

The number of cataract cases at this school for the blind has been high as is indicated by the percentages ranging from 11.1 per cent to 17.8 per cent. During the last four years of the study a number of the pupils having cataracts were enrolled in the classes for the partially seeing. At this point it might be of interest to note that it is believed possible that congenital cataracts can be caused by the mother having German measles early in her pregnancy.

Dr. Riemer reported in 1945, after an investigation had been made in Australia, it was claimed that when a woman contracted German measles within the first two months of pregnancy the chances of her giving birth to a congenitally defective child

are about 100 per cent, and if she contracts German measles in the third month the chances are about 50 per cent.[34]

Dr. Perera believes that this matter deserves more study and research in order to clarify certain issues regarding preventive and therapeutic measures. Perhaps there may be real grounds for exposing young girls to rubella (German measles) so that they will be immune in later life.[35]

Iowa has regularly, during this period of this study, had from two to four cases of dislocated lenses. A partial dislocation might be classified as a subluxation, which consists of a tilting of one edge of the lens, or of a lateral displacement - upward, downward, inward or outward.

Under the classification of the choroid and retina there are such causes as retinitis, chorioretinitis, detached retina, and retinitis pigmentosa. Retinitis claims from one to four cases during the last eight years of the study with none listed the first two years. Chorioretinitis shows a larger percentage than retinitis, ranging from 1.2 per cent to 4.5 per cent or seven cases in the last year. Frequently, if the choroid is affected the retina may also be affected.

Retinal detachment is closely associated with cases of high myopia. It has been thought that two-thirds of retinal detachments occur in myopes. Because of the elongation of the eye in cases of high myopia the retina is stretched thin and may very easily be detached. For this reason it is wise to avoid sudden jars in diving, or jumping, or any sudden blow or fall. If a child is aware of rapid loss of vision he should be

taken to an oculist immediately, for some retinas can be re-attached if operated upon soon enough. There has been a gradual increase in the number of cases of detached retina during the past six years in Iowa, but the percentage is still low (1.9 per cent).

Retinal degeneration (chiefly retinitis pigmentosa) has caused from three to eight cases of the blindness recorded for the period of this study. Retinitis pigmentosa is a degenerative condition commonly known as night blindness. There is a gradual loss of peripheral vision due to destruction of the pigment. Blindness frequently occurs in middle life.

There are many kinds of optic nerve atrophy and numerous causes, among which are syphilis, meningitis, trauma, and others.

Blindness caused by optic nerve atrophy had a high percentage of 10.8 in 1939-1940, with the number of cases varying from nine to nineteen for the period of this study. Retrobulbar and intra-cranial lesions showed a variance of from .5 per cent to 6.3 per cent in 1943-1944. Miscellaneous and ill-defined causes showed the greatest decrease of any. They dropped from 45.5 per cent in the first year to 2.6 per cent in the last year. This indicates that there has been considerable improvement in the manner of recording the eye conditions.

While the condition retrolental fibroplasia[36,37,38] has not been listed under causes of blindness, it is often spoken of today so will be briefly mentioned here. Several pre-school children in Iowa were known to have retrolental fibroplasia during the last year of this study.

This condition, according to some doctors, had been known for at least seventy-five years but has been encountered more frequently since more premature babies are kept alive. According to the medical definition, a premature baby is one whose weight is under five pounds, irrespective of the duration of the gestation. The definition of retrolental fibroplasia is a "growth of abnormal fibrous tissue behind the crystalline lens". Dr. Theodore L. Terry of Boston established the diagnosis of retrolental fibroplasia in 1941. Thus far it is believed that the condition nearly always involves both eyes although one eye may be affected to less extent than the other.

CHAPTER IV

A Comparison Within the Ten-Year Period of the Distribution of the Amount of Vision Remaining [38, 39]

The chart used for this study is the one compiled by The Committee on Statistics of the Blind which is jointly sponsored by the American Foundation for the Blind and the National Society for the Prevention of Blindness.

The definition of blindness used in this study is the one accepted by the above-named committee. Their standard definition of economic blindness is:

> Central visual acuity of 20/200 or less in the better eye, with correcting glasses; or central visual acuity of more than 20/200 if there is a field defect in which the peripheral field has contracted to such an extent that the evident diameter of visual field subtends an angular distance no greater than 20 degrees.

If the person being examined indicates the presence or absence of illumination when a light is thrown upon the eye with an ophthalmoscope or lens in a dark room he would be considered as having light perception (L.P.).

If he cannot correctly read the top letter on the Snellen Chart when very close, the examiner might hold up several fingers before a dark background for the patient to distinguish; the distance from the examiner's hand to the patient is recorded in feet or meters.

A Comparison Within the Ten-Year Period of the
Distribution of the Amount of Vision
Lost
Beginning

The chart used for this study is the one compiled by
the Committee on Statistics of the Blind which is jointly
sponsored by the American Foundation for the Blind and the

The definition of blindness used in this study is the
accepted by the above-named committee. Their standard
definition of economic blindness is:

> Central visual acuity of 20/200 or less in
> the better eye, with correcting glasses; or central
> visual acuity of more than 20/200 if there is a
> field defect in which the central visual fields are com-
> pressed to such an extent that the widest diameter
> of visual field subtends an angular distance no
> greater than 20 degrees.

If the person being examined has either the vacuous or
image of illumination when a light is thrown upon the eye
an opalescence or lens in a worse room or would be pre-
an native light perception (i.e.).

It is
Chart
Please
It has

In charting indefinitely specified cases the following assumptions were made: "Counts fingers at 3 feet, or 1 meter" was assumed to be approximately equivalent to 5/200 Snellen, while "counts fingers at 10 feet" was assumed to be approximately equivalent to 10/200.

If the patient's vision is less than 20/200 the distance from the chart is lessened and recorded as 15/200 or 10/200.

Because the Snellen chart is commonly used, a brief description of it will be given. A distance of 20 feet (6 meters) from the chart was selected because rays of light from this distance are practically parallel. The Snellen test type is scientifically constructed so that with normal vision the top letter on the chart can be read at 200 feet; the other rows of letters should be read at 100, 70, 50, 40, 30, 20, 15, and 10 feet respectively. Visual acuity is expressed in fractional form, but should not be reduced to represent percentages since the numerator connotes the number of feet the patient is standing from the chart and the denominator indicates the distance at which the smallest letters seen should be read by the normal eye. Thus normal vision is expressed as 20/20 (or 6/6 if the metric system is used). The second line from the top is 20/100; the third is expressed as 20/70; and so on down the chart. Occasionally people can read the line which should be read at 15 feet or at 10 feet when at a distance of 20 feet. This is recorded as 20/15 or 20/10.

TABLE III

TABLE III

Distribution of the Amount of Vision Remaining

	1946-1947		1945-46		1944-45		1943-44		1942-43		1941-42		1940-41		1939-40		1938-39		1937-38	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total Cases	157	100.0	146	100.0	150	100.0	154	100.0	151	99.9	164	100.0	170	100.0	176	100.0	197	100.0	191	100.0
Absolute blindness	29	18.5	29	19.9	35	23.3	34	27.0	35	23.5	37	22.6	36	21.2	37	21.0	28	14.2	32	16.8
Light perception (and /or projection)only	21	13.4	18	12.3	16	10.7	12	9.5	10	6.7	13	7.9	13	7.6	13	7.4	26	13.2	27	14.1
Motion perception and form perception up to but not including 5/200	18	11.5	18	12.3	11	7.3	15	11.9	14	9.4	15	9.1	17	10.0	17	9.7	19	9.6	18	9.4
5/200 up to but not including 10/200	7	4.4	7	4.8	5	3.3	4	3.2	7	4.7	8	4.9	7	4.1	7	3.9	8	4.1	13	6.8
10/200 up to but not including 20/200	15	9.5	15	10.3	14	9.3	14	11.1	15	10.1	14	8.5	16	9.4	17	9.7	21	10.7	16	8.4
20/200	30	19.1	28	19.2	30	20.0	22	17.5	25	16.7	29	17.7	32	18.8	32	18.2	36	18.3	37	19.4
Better than 20/200 with peripheral limitation indicated:																				
Peripheral field 20 or less																				
Peripheral field greater than 20																				
Peripheral field limitation, amount not known																				
Better than 20/200 up to and including 20/70 with no limitation indicated	29	18.5	26	17.8	28	18.7	13	10.3	24	16.1	26	15.9	29	17.1	32	18.2	27	13.7	26	13.6
Better than 20/70 with no peripheral limitation indicated	5	3.2	3	2.0	10	6.7	7	5.5	16	10.7	20	12.2	17	10.0	18	10.2	16	8.1	8	4.2
Not reported	3	1.9	2	1.4	1	.7	5	4.0	3	2.0	2	1.2	3	1.8	3	1.7	16	8.1	14	7.3

To see how the metric system compares with the Snellen system the following table is given:

TABLE IV

VISUAL ACUITY CONVERSION TABLES

Metric System	Snellen System	Percentage
6/5	20/15	100% (plus)
6/6	20/20	100.0
6/9	20/30	91.5
6/12	20/40	83.6
6/15	20/50	76.5
6/21	20/70	64.0
6/30	20/100	48.9
6/60	20/200	20.0
5/60	20/240	14.0
4/60	20/300	8.0
3/60	20/400	3.3
2/60	20/600	0.6
1/60	20/1200	0.1 (minus)

NOTE:
Percentages of visual efficiency shown above are as published in U.S. Department of Labor Bulletin #406.

Many times the oculist uses the A.M. A. (American Medical Association) Test Chart to denote the visual acuity. As a further means of comparison with the Snellen Chart both ratings are given.

TABLE V
TEST CHARTS AND THEIR LIMITATIONS

Line No.	A.M.A. Test Chart	Visual Efficiency (Per cent)	Snellen Rating	Visual Acuity (Per cent)
1	LTVUPRHZFDNG	100	20/20	100
2	FDNEGHBSCYRL	95	20/25.7	78
3	TYODZEGHBP	90	20/32.1	62
4	UPNESRDH	85	20/38.4	52
5	CVOFEHS	80	20/44.9	44
6	OCLGTR	75	20/52.1	38
7	NRTSYF	70	20/60.2	33
8	EOBCD	65	20/68.2	29
9	UFVP	60	20/77.5	26
10	HTSC	55	20/86.8	23
11	PER	50	20/97.5	20
12	DBG	45	20/109.4	19
13	YLV	40	20/122.5	16
14	F P	35	20/137.3	14
15	NZ	30	20/155	13
16	O C	25	20/175	11
17	HE	20	20/200	10

[40] Luckiesh, Matthew, Light, Vision and Seeing, D. Van Nostrand Co., Inc., New York City, 1946, p. 161.

The line-numbers are those of the A.M.A. test-chart, both sides of which are reproduced in a continuous length. In the third column are the A.M.A. ratings of visual efficiency. For comparisons the corresponding Snellen ratings and visual-acuity ratings are presented.

Peripheral vision, also known as indirect vision, is indistinct but is of great importance for guidance and safety. The field of vision represents the limits of peripheral or indirect vision; it is the space within which an object can be seen while the eye remains fixed upon some one point. Peripheral vision is best charted when an instrument known as the perimeter is used.

Frequently ophthalmologists use abbreviations or signs in making eye reports. Those which follow may prove helpful in interpreting some of their reports.

TABLE VI

Abbreviations and Signs used in Ophthalmology

41

A. or ACC.	Accommodation
Am.	Ametropia
As.	Astigmatism, astigmatic
As.H.	Hyperopic astigmatism
As. M.	Myopic astigmatism
Ax.	Axis (of cylindrical lens)
B.	Base(of prism)
C. or Cyl.	Cylindrical lens or cylinder
D.	Diopter
E.	Emmetropia or emmetropic
F.	Field of vision
H.	Hyoperopia, hyperopic, horizontal
Hl.	Hyperopia latent
Hm.	Hyperopia manifest
Ht.	Hyperopia total
M.	Myopia or myopic
'''	Line
V	Centrad (prism)
n.	Nasal
O.D. (R., or R.E.)	Oculus dexter (right eye).
O.S. (L., or L.E.)	Oculus sinister (left eye).
O.U.	Oculus uterque (both eyes).
Oph.	Ophthalmoscope or ophthalmoscopic
P.D. (Δ)	Prism diopter
P.L. (or L.P.)	Perception of light

TABLE VI (continued)

P.p.	Punctum proximum (near point)
P.r.	Punctum remotum (far point)
Pr.	Presbyopia
S. or Sph.	Spherical lens
t.	Temporal
T.	Tension
V.	Vision, visual acuteness, vertical
w.	with
+	plus or convex
-	minus or concave

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41 Adapted from May, Charles H., Diseases of the Eye, William Wood and Company, Baltimore, 1941, pp. 359-360.

In an over-all view of the amount of vision remaining, it is interesting to note that the highest percentage (27.0) of absolute blindness is evinced in 1943-1944. This is of particular interest since that was the year the sight-saving program was introduced in the Iowa School. In counting the actual number of students there were from one to three more for five of the years but the percentages were lower.

The highest percentage (14.1) for"light perception(and /or projection) only" was in the first year of the survey with two other high years being 1938-1939 and 1946-1947. The greatest number of students for any one year under this classification was twenty-seven in 1937-1938, with one less the following year.

"Motion perception and form perception up to but not including 5/200" applies to a smaller portion of the enrollment. In 1945-1946 there was a high of 12.3 per cent. The actual number of students (18) remained the same for two other years and exceeded this by one (19) in 1938-1939.

Those classified within the range of "5/200 up to but not including 10/200" vary in percentages from 3.2 to 6.8 per cent, with the number of cases varying from four to thirteen.

Under "10/200 up to but not including 20/200" there are from fourteen to twenty-one cases, with the percentages ranging from 8.4 (1937-1938) to 11.1 (1943-1944).

Vision of 20/200 is, according to the definition given, classified as blind. The number of cases for the ten years range between twenty-two and thirty-seven, with percentages varying from 16.7 (1942-1943) to 20.0 (1944-1945).

When the columns from "absolute blindness" to and including "20/200" vision are totalled the following figures result:

Total cases	Year
120	1946-1947
115	1945-1946
111	1944-1945
101	1943- 1944
106	1942-1943
116	1941-1942
121	1940-1941
123	1939-1940
138	1938-1939
143	1937-1938

The first two years of the study show the largest number of cases of blindness, with a gradual decline up to 1943-1944, and from there an increase in the last three years.

The students recorded as having vision of"better than 20/200 up to and including 20/70 with no limitation indicated" are the ones usually classed as sight-saving students. Of this group the cases range in number from 13 (1943-1944) to 32 (1939-1940). Percentages show a variance of from 10.3 (1943-1944) to 18.7 (1944-1945).

It would not be anticipated that any cases would be recorded under the next classification of "better than 20/70 with no peripheral limitations indicated", but as high as 20 were listed in 1941-1942 with a low of 3 in 1945-1946. While there were only 4.2 per cent in this group in the first year of the study, there was a tremendous increase for the next five years. The last four

years of the study indicate a decrease with as low as 2.0 per cent in 1945-1946. This is a drop in percentage from a high of 12.2 per cent in 1941-1942.

According to this examination of the eye reports there still are a few cases each year in which the visual acuity is omitted. Occasionally a child enters late in the school year and does not have an opportunity to visit the oculist before school closes. Frequently a child is too young to cooperate with the oculist in his attempt to establish the child's visual acuity. This being so, a few cases could legitimately be expected each year. However, it is worth noting that in the first two years of the study 7.3 per cent and 8.1 per cent were not reported.

Reading back on the chart it is understood that not all of the pupils listed under "20/200" would necessarily be braille students. Since, from the information given, there is no way of denoting which should be braille students and which should be sight-saving students it will be assumed that all of the children having 20/200 vision are sight-saving students.

With this in mind the following table is submitted:

TABLE VII

Possible Sight-Saving Students

(a) Better than 20/200 up to and including 20/70 with no limitation indicated
(b) Better than 20/70 with no peripheral limitation indicated

	1946-47		1945-46		1944-45		1943-44		1
	No.	%	No.	%	No.	%	No.	%	N
20/200	30	19.1	28	19.2	30	20.0	22	17.5	2
(a)	29	18.5	26	17.8	28	18.7	13	10.3	2
(b)	5	3.2	3	2.0	10	6.7	7	5.5	1
Total	64	40.8	57	39.0	68	45.4	42	33.3	6

Keeping in mind the fact that a class for children with partial vision was introduced in the school in 1943-1944, it is interesting to note that this year had a possible low of 42 students (33.3 per cent). During 1944-1945 the second sight-saving class was introduced. These figures would indicate a possible 68 students (45.4 per cent), with three earlier years revealing lower percentages. During the last two years of the study three classrooms were maintained for students with partial vision. The possible number of pupils for those years were 57 (39.0 per cent) and 64 (40.8 per cent) respectively.

TABLE VII

Possible Sight-Saving Students

(a) Better than 20/200 up to and including 20/70 with no limitation indicated
(b) Better than 20/70 with no peripheral limitation indicated

	1946-47		1945-46		1944-45		1943-44		1942-43		1941-42		1940-41		1939-40		1938-39		1937-38	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
20/200	30	19.1	28	19.2	30	20.0	22	17.5	25	16.7	29	17.7	32	18.3	32	18.2	36	18.3	37	19.4
(a)	29	18.5	26	17.9	28	18.7	13	10.3	24	16.1	26	15.9	29	17.1	32	19.2	27	13.7	26	13.6
(b)	5	3.2	3	2.0	10	6.7	7	5.5	16	10.7	20	12.2	17	10.0	18	10.2	16	8.1	8	4.2
Total	64	40.8	57	39.0	68	45.4	42	33.3	65	43.5	75	45.8	78	45.9	82	46.6	79	40.1	71	37.2

Keeping in mind the fact that a class for children with partial vision was introduced in the school in 1943-1944, it is interesting to note that this year had a possible low of 42 students (33.3 per cent). During 1944-1945 the second sight-saving class was introduced. These figures would indicate a possible 68 students (45.4 per cent), with three earlier years revealing lower percentages. During the last two years of the study three classrooms were maintained for students with partial vision. The possible number of pupils for those years were 57 (39.0 per cent) and 64 (40.8 per cent) respectively.

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PART II

A Suggested Plan for the Education of the Blind and Partially Seeing Children in Iowa

Chapter I

A Brief Review of the Educational Plans for the Blind and Partially Seeing Children at the Iowa School for the Blind from 1937 to 1947.

CHAPTER II

The Oregon Plan.

Chapter III

The New Jersey Plan.

Chapter IV

A Skeletal Plan for Iowa.

PART II

A Suggested Plan for the Education of the Blind and Partially Seeing Children in Iowa.

Chapter I

A Brief Review of the Educational Plans for the Blind and Partially Seeing Children at the Iowa School for the Blind from 1937 to 1947

In general, the education of the blind children of Iowa is much the same as the education of blind children in any other state where a school for the blind is the only agency caring for children thus handicapped. The pupils come to the school in September and remain for nine months, except for short vacations at Christmas and in the spring. Classes begin at eight in the morning and continue as scheduled classes until four in the afternoon, with additional hours for those in the chorus, those having music lessons, and those active in sports. Work, on the whole, is planned for the children who are blind, although it can clearly be seen by referring to Table III that a large number of children with partial vision have been in attendance during the entire time covered by this study.

In addition to visual handicaps it is not unusual to find cases of encephalitis, epilepsy, spasticity, and various types of speech and hearing defects. The doors of the school are open to those who fall fairly well down the scale in mental ability.

Teachers, housemothers and house masters live close enough to the children to become quite familiar with the eccentricities of each child in and out of the classroom.

The school population varied in this study from 126 pupils to 197. According to the 1947 report by Miss Helga Lende there are 29 teachers and 44 other full time employees.[1]

Until recent years both equipment and methods have been geared to the abilities of the blind child. Very likely the blind child has been considered the well-adjusted child, while the child with partial vision has been the trouble-maker.

In the early years, Mr. F. E. Palmer, then superintendent of the school, realized that the children with partial vision needed help and aided them by not excluding them from the school. Mrs. E. C. Evans, the state field agent, was an ardent promoter of additional assistance for the partially seeing children within the school. When Mr. Leslie M. Hays assumed the responsibilities of superintendent, Mrs. Evans presented the needs of these children to him. In due time a state appropriation was secured for a sight saving class in the school for the blind. Through the splendid cooperation of the faculty, the principal (Miss Georgie Lee Abel), and the superintendent, a class of nine students was started in September, 1943. By the end of the year twenty-three students were being given some assistance from this room.

Since that time two other rooms have been equipped with the essential materials for sight saving thus giving more children with partial vision the opportunity to have the

additional assistance they need from the first through the twelfth grade. The children from these rooms attend the regular classes with the other children of the school, returning to the well-lighted room for work requiring use of their eyes.

While many problems arise when such a program is promoted, Iowa has taken the initial step in attempting to give the child with partial vision an opportunity to learn in surroundings suited to his needs.

Chapter II

The Oregon Plan[2,3]

In considering the development of the educational program for blind and partially seeing children, it can be thought of as progressing through three stages. The first step was the education of the blind in a residential school. The second step was the establishing of braille and sight saving classes in the public schools. The third step seems to be in process of development. This step can probably best be understood by explaining the plans used in Oregon and in New Jersey.

A brief summary of the descriptions given by Dr. Berthold Lowenfeld and Ethel Nestell Fortner will present the general ideas of the Oregon plan. According to their reports Oregon is attempting to bring assistance to its handicapped children wherever they are located in the state's 96,000 square miles. Since this report is concerned only with the blind and the partially seeing child, the other phases of the plan will be omitted.

The public schools of the state, the Oregon State School for the Blind, the State Board of Health, the County Health Departments and the State Department of Education are the cooperating agencies. "The aims of the program are to prevent the occurrence and development of handicaps, and to help the child who has a handicap to make a more satisfactory personal, social, and economic adjustment than he would otherwise achieve."

Chapter 12

Three essential principles pointed out by Dr. Lowenfeld are:

> First, any child who can be educated in the public schools should not be institutionalized or even segregated.
>
> Second, the residential school for the blind has as its aim the rehabilitation of visually handicapped children for public school education and is not interested in keeping children any longer than necessary.
>
> Third, each child has a right to individualized services (a) in regard to optimum restoration of sight, and (b) in regard to the use of aids which will conserve and safeguard his sight.

The Superintendent of Public Instruction coordinates all the educational activities of the state that pertain to the handicapped child. If a handicapped child is in a given school district, that district is responsible for his education, subject to the approval of the Superintendent of Public Instruction. Children may be transferred to other districts when this is considered advisable. When there are excess expenditures beyond the regular per capita cost in a district, that district is eligible for reimbursement from the state. Definite standards are set up for this eligibility.

Children with visual impairment are referred to the State Department of Education by teachers, parents, superintendents, county superintendents, public health departments, and nurses.

A detailed program is set up for training teachers in detecting visual difficulties, in giving screening tests, and in using various aids for the child who is visually handicapped. Free pamphlets are sent to the teachers and nurses from the Division of Special Education. Institutes are held to

familiarize the teachers with problems of the blind and partially seeing child. Educational clinics make the services of the specialists of the Division of Special Education available to children. The State Supervisor gives advice to teachers concerning educational adjustments and aids in seeing that the children have the necessary special equipment, such as large-type books, adjustable desks, sight saving paper, pencils and chalk.

The residential school serves as a "clinical clearing house for visually handicapped problem cases". No pupils are kept at the school beyond the tenth grade and plans are being made to refer the students to the public schools when they have completed eighth grade work.

Chapter III

The New Jersey Plan[4,5]

New Jersey, like Oregon, has made provisions for the education of all of the types of exceptional children; however, only the visually handicapped are being considered here.

The New Jersey Commission for the Blind is under the supervision of the State Department of Institutions and Agencies. It would seem that New Jersey is in the third stage of development in providing for its blind and partially seeing children. Since there is no school for the blind in the state, the Commission for the Blind functions as the clearing house. Names of candidates possibly qualifying for assistance from the state are referred to the Commission where each is considered on an individual basis.

Within the Commission there are several departments, but the description given here is confined chiefly to the work done by the Department of Education. In this department there is a director of education, a pre-school worker, an educational counselor for children in the elementary grades, and an educational counselor for students in the secondary grades and colleges.

The pre-school worker- a trained nurse - visits the home of the blind or partially seeing child, advising the parents concerning the child's eating habits, toilet training, play habits, and "blindisms" to be avoided, and encouraging the parents in their efforts to understand the problems confronting

them. Literature concerning blind or partially seeing children is left for the parents to read. Toys from the Commission are sent to the child to encourage him in active play. If the parents and child need further assistance, routine visits are planned and the child is given the help he requires.

The educational counselor for children in the elementary grades visits schools and homes of blind and partially seeing children in rural and suburban areas where braille and sight saving classes are not available.

There are several possibilities to consider in arranging for the child's education. If he has partial vision and is in the lower grades, any of the following plans may be considered:

1. The child may attend one of the sight saving classes in the state
   a. Living at home, if the class is in his city
   b. Living in a boarding home near the sight saving class
   c. Being transported by cab or bus from a neighboring town
2. The child may attend the public school, receiving books and other materials from the Commission and assistance from the counselor

If the child is blind and is in the elementary grades, any of these plans may be considered:

1. The child may learn braille reading and writing at home through services provided by the Commission, and attend the public school
2. The child may attend a braille class by any of the means previously mentioned for attending a sight saving class
3. The child may attend an out-of-state residential school for the blind.

The counselor discusses these possibilities with the school, the parents, and the child, and helps the child in his adjustment to the selected plan.

The counselor for students in secondary schools and colleges aids in the provision of:

1. Tutor-reader services
2. Books in braille or large type
3. Talking books and recorded material
4. Typewriters, braille writers, mathematical equipment, and other special materials.

Conferences are held with the student, his parents and teachers, and vocational guidance is given.

The director of the department of education acts as coordinator of the work in the department, with other departments of the Commission, and with state and local agencies. The supervision of the children in braille and sight saving classes in the state, and of the children sent to out-of-state residential schools, as well as the direction of a summer camp

are further responsibilities. Helping to decide which educational program best meets the child's individual academic, social, emotional, and vocational needs is another big responsibility.

One of the important factors in this plan is the lending library. Braille-books, clear type books, talking books, braille writers, braille slates, typewriters, sight saving paper, pencils and chalk, and educational equipment of numerous other types may be borrowed for any desired length of time. Volunteer workers record many books in braille and on plastic records for students in high school and in college.

A mobile eye health clinic provides the opportunity for all children in rural areas to have an examination by an ophthalmologist. When financial assistance is needed for further eye care, it is provided through the services of the Prevention of Blindness Department of the Commission.

Films are shown, exhibits are arranged, lectures are given, and literature is distributed to promote proper care of the eyes.

Chapter IV

A Skeletal Plan for Iowa

In initiating sight saving classes at the Iowa School for the Blind, Iowa took its first step in helping its children with partial vision. While there are many arguments against having such classes in a school for the blind, this arrangemert may be considered better than making no provision for these "forgotten children". In this section an attempt will be made to outline briefly other possible means of assisting children with visual impairment by using ideas from the New Jersey and Oregon plans and by adding other ideas.

The area of the state and the population of the schools are two important items to be considered in suggesting a plan for a whole state. The following table is submitted for a comparative study of the three states:

TABLE VIII

The Area[6] and Population[7] of Three States

State	Area	Population (1940)	Elementary School (1945-1946)	Secondary School (1945-1946)
Oregon	96,981	1,089,684	192,361	62,393
New Jersey	7,836	4,160,165	451,306 (1945-1946)	172,802 * (1945-1946)
Iowa	56,280	2,538,268	238,608 (1944-1945)	215,634 (1944-1945)

* It is possible that the seventh and eighth grade population is not included in this.

Using the above figures and estimating that there may be one partially seeing child in every five hundred of normally seeing children of school age,[8] Iowa may have approximately 475 in the elementary grades and 430 in the secondary grades. Estimating one blind child in every thousand seeing children, Iowa may have 238 in the elementary grades and 215 in the secondary grades. According to Table III in Part One of this study there was a total of 150 blind and partially seeing students in the combined elementary and secondary grades for 1944-1945. The greatest enrollment for any year since 1937 was 197 in 1938-1939.

While the above figures serve only as a rough estimate of the number of visually handicapped children in Iowa, it seems that many children are deprived of the opportunity of having the educational facilities deserved.

Several cities in Iowa have a sufficiently large population to warrant starting sight saving classes or combination braille and sight saving classes. The following table of cities with the population recorded according to the 1940 census[9] will serve as a basis for suggesting possible cities.

TABLE IX

The Population of the Ten Largest Cities in Iowa

Burlington	25,832	Des Moines	159,819
Cedar Rapids	62,120	Dubuque	43,892
Clinton	26,270	Ottumwa	31,570
Council Bluffs	41,439	Sioux City	82,364
Davenport	66,039	Waterloo	51,743

Since the above-stated population is not the school population, no attempt will be made to estimate the number of visually handicapped to be anticipated. It is possible that any one of these cities may have enough children to start a class.

Making a slightly more conservative suggestion and considering the geographic area, it is possible that classes should be opened in Sioux City and Council Bluffs in the western part of the state; in Davenport, Dubuque, and possibly Burlington in the eastern part of the state; and in Cedar Rapids and Waterloo in the central part of the state. Des Moines has an opportunity school which makes some provision for its handicapped children, but it is possible that this needs to be expanded so far as its partially seeing children are concerned. Since Cedar Rapids and Waterloo are near Vinton, the children in these cities might easily attend the School for the Blind, but having a class in each city, and

thus giving the children the opportunity of living at home, would seem advisable. A class in Waterloo, which is near the State Teachers' College, might serve as a demonstration class for the training of teachers in this field of work, thus serving two purposes.

It has been noted that the main difficulty of the Oregon plan is the lack of personnel to successfully carry it on in a geographically large state. New Jersey's geographic area is not great, its population is condensed mainly in the northern part of the state, and the state lends itself readily to the division into "North Jersey" and "South Jersey". All of these are assets in conducting a program such as New Jersey has. Iowa, with its area of 56,280 square miles, would encounter some of the same difficulties as those cited for Oregon.

It may be considered wisest to divide the state of Iowa into two parts, having the main office of the eastern half of the state located at the School for the Blind in Vinton, with the Commission for the Blind in Des Moines serving as a sub-office for the western half of the state.

The entire program may function under the leadership of the State Superintendent of Public Instruction, with more direct supervision by a Division of Special Education which maintains an interest in all exceptional children in the state. The details of the program may be handled by a Director of Education of the Visually Handicapped located at Vinton. In addition to the state department of education,

other cooperating agencies may be divisions of the health department, the public schools, the homes, and the School for the Blind. One educational counselor may work from the Vinton office, covering the eastern area; and a second counselor may work from the DesMoines office, covering the western area. If funds warrant it, a pre-school worker and two counselors for each half of the state may be advisable. These workers would be under the supervision of the Director of Education of the Visually Handicapped.

Nurses throughout the state may train teachers to help them in the first screening for eye difficulties. A mobile eye health service functions nicely in New Jersey and may prove a means of reaching sections in Iowa where services of an ophthalmologist would not be available. The full time services of an ophthalmologist and a medical technician would be needed for this mobile unit, with a permanent office in either the School for the Blind at Vinton or the State University Hospital at Iowa City.

A library is an important part of this plan. A librarian in addition to the regular school librarian would be needed to have charge of the books and materials to be sent out to blind and partially seeing students in the public schools. Building a useful library of braille and clear type books, talking book machines and records, braille writers, typewriters, mathematical equipment, maps, braille and clear type music, recordings for children, and games would be essential.

With blind and partially seeing students attending public schools, a variety of materials will be needed. A well-organized force of volunteer workers in different cities and small towns may produce a wealth of useful products if supplied with the essential working materials.

Well-trained teachers may be considered an essential part of this plan. Each teacher should have some special training in addition to the regular work required of public school teachers. The State Teachers College and other teacher-training centers may provide some of this training in extension courses, in summer sessions, and as a part of the annual program. The Director of Education of the Visually Handicapped may hold district institutes where county superintendents become familiar with the problems of the visually handicapped child and learn of some suggestions for the solution of the problem. The county superintendents may then hold county meetings, passing this information on to the teachers. In-service training may be carried on regularly during the school year.

The Director of Education may maintain a master file of all of the cases referred as needing assistance. Each counselor or worker will maintain a file of his cases. Cumulative folders with anecdotal records will be helpful.

In this plan, as in the Oregon plan, the school for the blind may serve as a clearing house when children are in need of ophthalmological care which may be secured through the services of the hospital at the State University of Iowa. There will, no doubt, still be a need for the classes for the

partially seeing, since many of these children should not attend the schools which do not have the special equipment, and the classes in the public schools probably will not be able to serve all of the surrounding rural areas. Blind children who have above average mental ability and are socially and emotionally well-adjusted may be encouraged to attend public schools. If it seems wisest for a child to attend the school for the blind first, to gain a working knowledge of reading and writing braille, and to enter public school later, provisions of that kind may be made. High school students may be encouraged to attend public schools. In general, the school for the blind may best serve those children with multiple handicaps, those of average or below average mental ability, those needing additional ophthalmological care, those who would profit emotionally and socially by working in smaller groups, and those who need a home. This should be considered a challenge to the teachers in the school for the blind.

Each blind and partially seeing child in the state should be considered on an individual basis and should have the advantage of an educational program best suited to his needs.

PART II

Footnotes

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